MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for October, 1903, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph and mail, 166; West Indian Service, cable and mail, 15; River and Flood Service, 52, river and rainfall, 177, rainfall only, 62; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 2962; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Territorial Meteorologist, and Mr. R. C. Lydecker, Acting Territorial Meteorologist, Honolulu, H. I.; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San José, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Stormy weather prevailed over the eastern Atlantic and British Isles from the 1st to the 6th, 11th to the 17, and 20th to the 31st. Over the western Atlantic the weather was quiet from the 1st to the 7th. During the 8th a barometric depression moved eastward over the Atlantic coast of the United States, and during the succeeding three days a storm of great violence occupied the ocean between Bermuda and the American coast. During the 12th and 13th the center of this storm moved northeastward over the Canadian Maritime Provinces. From the 16th to the 18th a disturbance moved from the Gulf of Mexico northeastward over the Atlantic seaboard of the United States. On the 23d a disturbance of moderate intensity appeared over the Bahamas. Increasing in strength this storm moved northward to a position off the North Carolina coast during the 24th, and passed thence northeastward toward Nova Scotia during the 25th, attended by winds that exceeded 50 miles an hour on the North Carolina coast. During the 26th the center of disturbance moved northeastward over Newfoundland. From the 27th until the close of the month the weather of the western Atlantic was dominated by an area of high barometric pressure that remained nearly stationary over the middle-eastern districts of the United States. No important disturbance appeared over the Caribbean Sea.

The first important storm of the month in the United States advanced from the north Pacific to the Atlantic coasts from the 5th to the 8th, attended by general rains in the northern, eastern, and southeastern districts, by high winds on the north Pacific coast and the Great Lakes, and by gales of exceptional severity off the Atlantic coast. During the 8th, when the center of this storm was north of the east end of Lake Superior, a secondary disturbance of great strength developed in the southern end of a trough of low barometric pressure that extended from the Lake region to the middle Atlantic coast. This trough shifted position over eastern New York and New Jersey, and caused torrential rains in the Hudson Valley and New Jersey during the 8th and 9th, and high and increasing winds on the middle Atlantic and southern New England coasts, with maximum reported velocities ranging above 70 miles an hour on the Virginia coast on the 10th. During the northeast movement of the storm center on the 11th and 12th wind velocities of 60 miles an hour were reported on the southeast coast of New England. Storm warnings and advices were issued well in advance of this storm at all points in its course from the Pacific to the Atlantic.

The following comments regarding the work of the Weather Bureau in connection with this storm were made by the American Syren and Shipping, New York, October 17, 1903:

If any certification of the value of the forecast warnings of the Weather Bureau were required, the tributes paid to this service during the past few days by shipowners and shipmasters would be more than sufficient

to establish the practical value of the service rendered to maritime interests. On Wednesday, the 7th instant, the weather conditions from Point Isabel, Tex., to West Quoddy Head, Me., seemed to the average mariner to presage fair weather. But the scientific observers in the Weather Bureau discerned indications of a severe gale which would sweep the Atlantic coast from end to end, and they ordered storm signals set. Several hundred vessels that were ready to put to sea when the warnings came remained in port. Eighteen coastwise steamships and sailing vessels which went forth from harbors regardless of the signals came to grief. Some were battered by heavy seas and others were wrecked on shore. It has been estimated by experts who write on maritime subjects that the United States Weather Bureau since its establishment has saved property to the value of $20,000,000 per annum. The American Geographical Society sets a high value on the practical services of the Weather Bureau, rating it at 2000 per cent annual return on the cost of the yearly maintenance of the system. When the Weather Bureau was established few shipmasters or shipowners recognized its value, and not until hundreds of forecasts of severe gales along the coast were validated by storms did the men who follow the sea begin to repose confidence in the scientific work by the Weather Bureau. A generation ago veteran shipmasters found delight in putting to sea when the storm signals of the Weather Bureau were out. But in time the insurance companies and the shipowners, with minds open to the teachings of science, recognized the value of the weather forecasts and brought about a general respect for the work of the Weather Bureau. Of late years the only flagrant act against the value of the weather forecasts was the positive order by an official of the Portland Steam Packet Company to Captain Blanchard, of the steamboat *City of Portland*, to voyage from Boston to Portland, notwithstanding that the Weather Bureau had set storm signals all along the coast. No other steam or sailing vessel went out of a New England port that night. She was lost with all hands.

The second important storm of the month first appeared on the morning map of the 14th, when pressures were low on the southern Pacific coast and over eastern Kansas. During the 15th and 16th the southern Pacific disturbance moved eastward to the west Gulf district, and the Kansas disturbance northeastward to the Great Lakes. During the 17th the southwestern storm moved northeastward and the Lake storm eastward, and by the evening a trough of low barometer had formed over the Atlantic States with lowest pressure in the middle St. Lawrence Valley. Attending the eastward movement of this trough of low barometer high winds and rain were followed by a decided fall in temperature over the Atlantic seaboard. In connection with this storm warnings were displayed on the west Gulf coast the evening of the 15th, on the middle and east Gulf and south Atlantic coasts and the upper Lake region on the 16th, and on the middle Atlantic and New England coasts and the lower Lake region on the morning of the 17th.

During the 21st and 22d a disturbance of moderate strength advanced from the British Northwest Territories eastward over the upper Lakes and reached the St. Lawrence Valley on the morning of the 23d. From the 23d to the 26th a disturbance moved from the Bahamas northward to the Canadian Maritime Provinces. During the 26th the rapid advance of an area of high barometer from the westward, in conjunction with low barometric pressure off the north Atlantic coast, caused high northwest winds over the Great Lakes.

On the 16th a cool wave overspread the Rocky Mountain districts, and by the morning of the 17th the temperature had fallen below the freezing point in the States of the middle and upper Missouri Valley. During the next two days the cool wave extended east of the Mississippi River attended by frost in the interior of the South Atlantic and Gulf States and by freezing temperatures in the western parts of Virginia and North Carolina and eastern West Virginia. On the 22d and 23d a cool wave advanced from the Northwest over the central valleys and the Lake region, and on the morning of the 24th frost occurred in the interior of the middle and west Gulf States and freezing temperatures in the Ohio Valley. On the mornings of the 25th and 26th frost occurred in the east Gulf and South Atlantic States and extreme northern Florida. Frost again occurred in the Middle and South Atlantic States and the Ohio Valley on the morning of the 28th with freezing temperatures in the southern Appalachian Mountain regions. The frosts of the month in the crop growing districts were announced in the forecasts.

BOSTON FORECAST DISTRICT.

The chief and only unusual feature of the month was the storm which raged with more or less fury from the 8th to 13th, and will pass into history as among the most severe and long-continued disturbances for October on record. The New England coast suffered greatly from its force, beach property being damaged in places, and the coast line terribly scarred by wind and wave. Shipping of all classes remained tied up for four or five days in all New England harbors. The winds, generally easterly, were attended by rain and fog. The northwest gales of the 17th and 18th were very severe on parts of the southern coast, resulting in some loss of life and considerable damage to shipping. Warnings were issued well in advance of the storms and were of great value to shipping and other interests. Excepting the storms mentioned the weather of the month was seasonal and pleasant.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

October was mild and dry. The only features that called for special forecasts were occasional frosts for which timely warnings were issued. The first general frost warning was issued on the 24th and frosts occurred throughout the district almost to the coast.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

There were a few storms only of marked energy in the upper Lake region during the month, although none was exceptionally severe. One storm passed over on the 3d, another on the 6–7th, and still others on the 16–17th, 22d, and 26th. The wreck of the greatest importance during the month was that of the steamer *Erie L. Hackley*, which occurred in Green Bay on the night of the 3d–4th, and resulted in the loss of twelve lives. Warnings had been displayed at Green Bay fully twelve hours in advance of this storm. Warnings were ordered well in advance of all storms except the one on the 26th, which, however, was of short duration, although one steamer and one schooner, both unseaworthy, were wrecked. The weather conditions throughout the forecast district were uneventful, unusually pleasant weather, and moderate temperature prevailing during the greater portion of the month.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

During the first decade several forecasts of frost were sent to portions of Colorado. The special warnings of the morning of the 11th for northern New Mexico and selected points in Colorado marked the close of the season for warnings of this character. There were no cold waves, and the weather throughout the district was in the main fine and seasonable.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month was an exceptionally dry one. The rainfall throughout the entire district being small. In fact the month was part of a period of prolonged drought. At San Francisco, for example, from April 16 until October 8, no rainfall amounting to .01 of an inch was recorded on any date. In other words, with the exception of a trace on May 25 and 26, June 11, August 14, and September 28 and 29, there were one hundred and seventy-five days without rain. So long a dry period is not to be found since the Weather Bureau records have been